

PHYSICS DEPT ISSUES

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*RESEARCH AND EXP. OPERATIONS STAFFING
RCF RESOURCE ISSUES
EVOLUTION OF DETECTORS AND EIC*

BROOKHAVEN
NATIONAL LABORATORY

a passion for discovery



U.S. DEPARTMENT OF
ENERGY

Office of
Science

General Overview

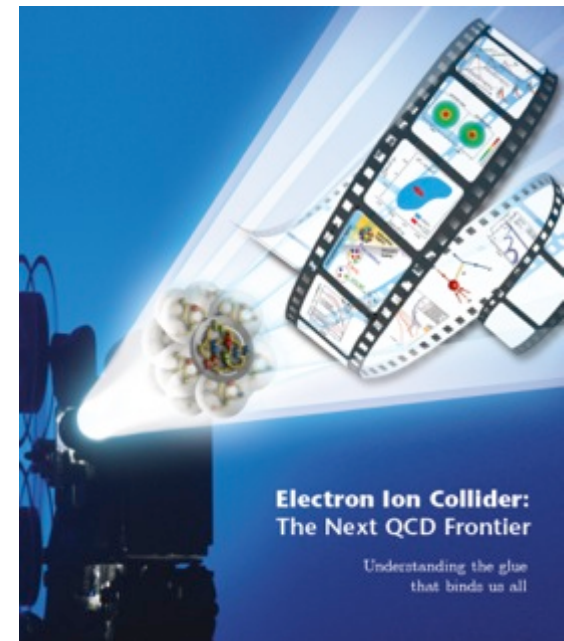
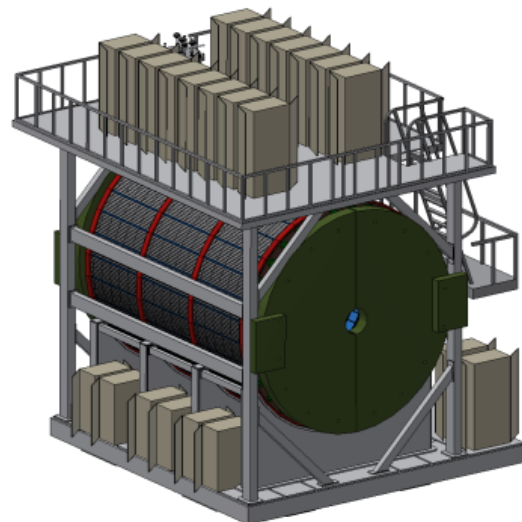
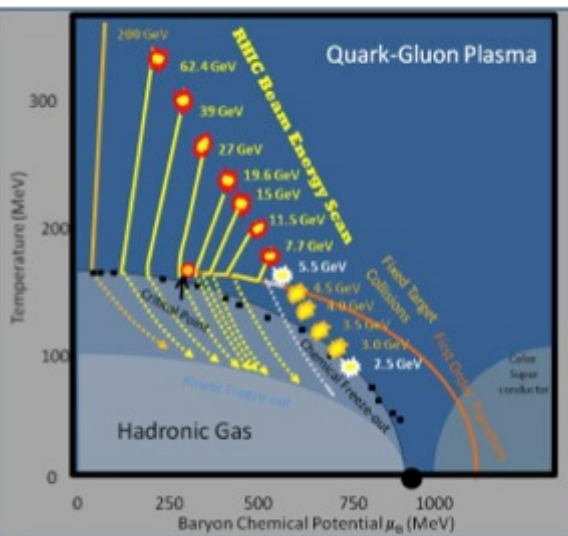
Until FY2017: Reap physics of RHIC II upgrades with heavy flavor, and exploit opportunities in RHIC Spin

After this, three-fold support for the community

STAR and RHIC: low-energy electron cooling for
Beam Energy Scan Phase 2

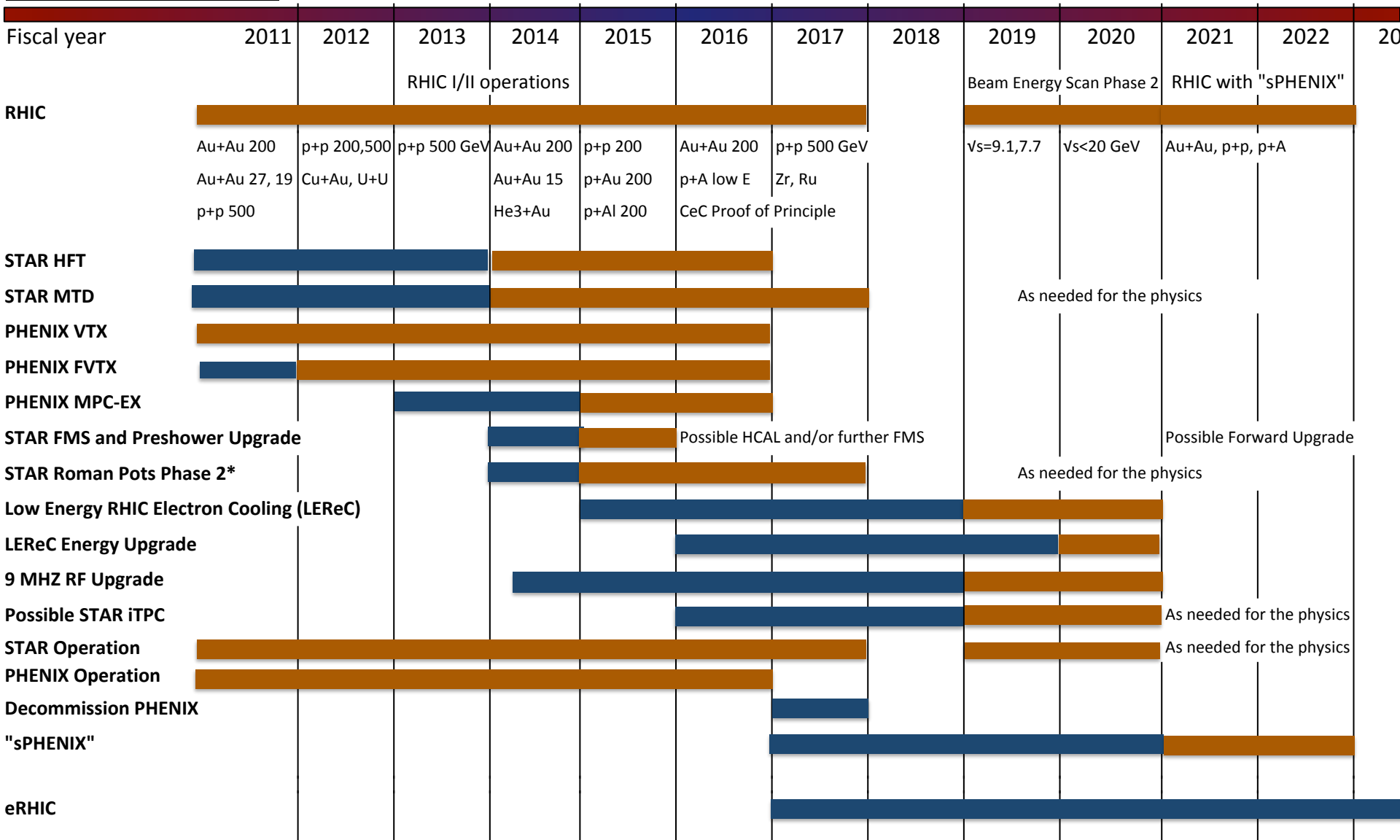
PHENIX decommissioned, transition to sPHENIX by FY2021

Grow community for EIC: e.g. Generic EIC detector R&D



Detailed Timeline

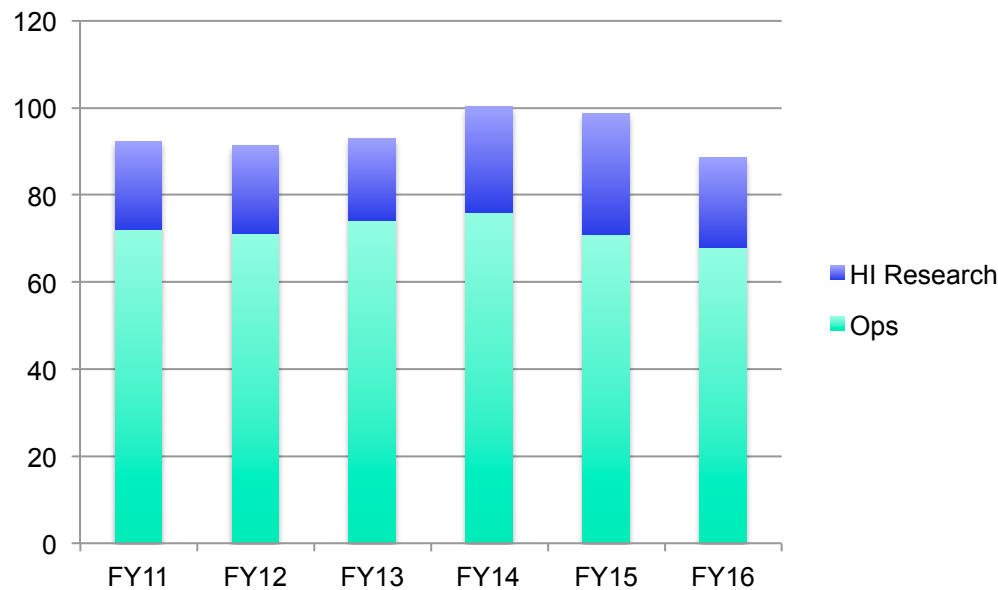
Tentative schedule for RHIC



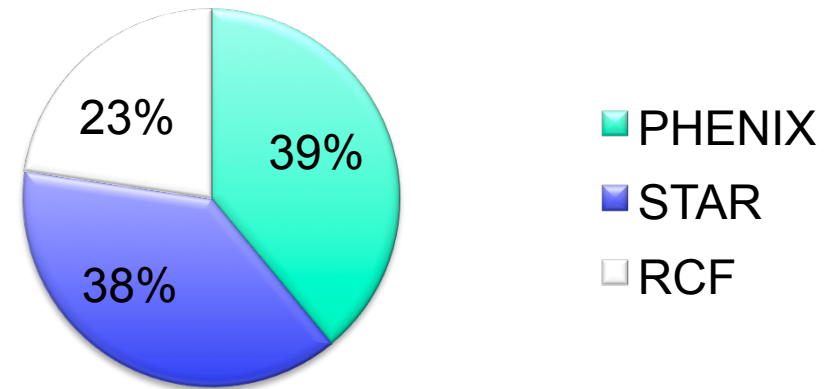
Design and Construction

Operations/physics

History of Staffing Levels



Operations Split FY2014



Staffing levels in heavy ion experiment at an unsustainable level

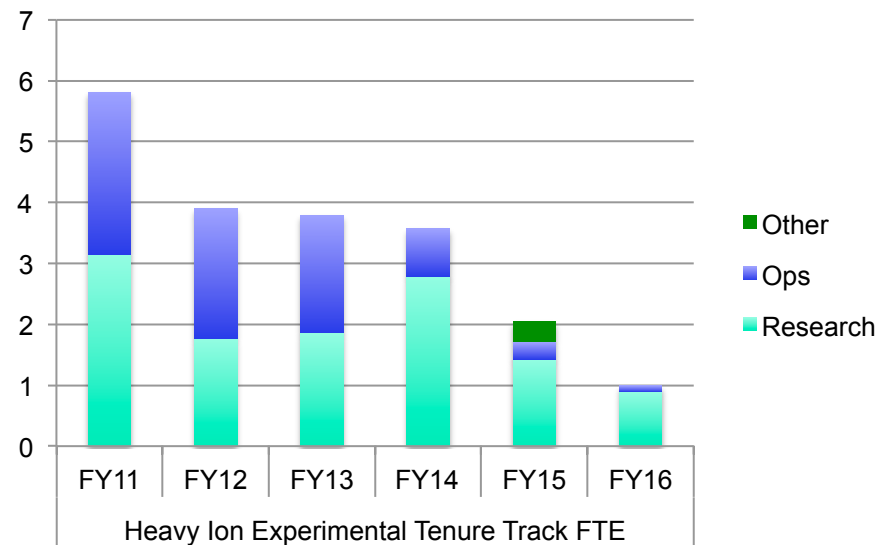
Has been possible in FY14-15 due to carryover from previous years

No longer possible: carryover exhausted

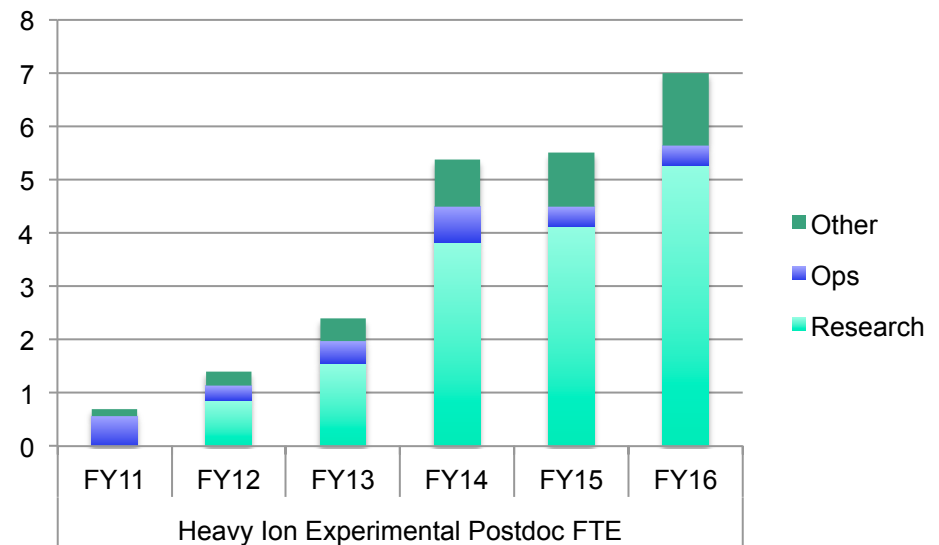
In process to reduce staffing by ~10 FTE for FY16

Early Career Population in Heavy Ion Experimental Groups

Tenure-Track

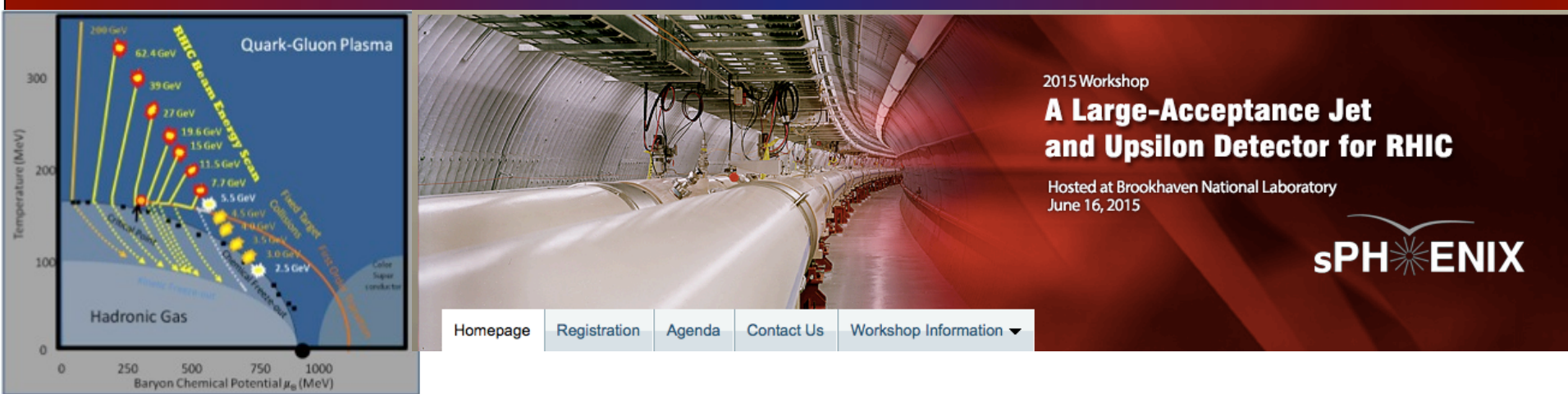


Post-Doc



- Have attempted to keep research vibrant with post-docs
 - Helped by Ruan Early Career award 7/2013-7/2018: funds 2-3 post-docs
 - Two Goldhaber Fellows currently
 - Likely need to allow this population to decrease by attrition
 - Reaching unsustainably low tenure-track population
 - Currently (FY16) only one Experimental Heavy Ion tenure-track position
- Also 1 in Medium Energy, 2 in Nuclear Theory

Staffing: Actions moving forward



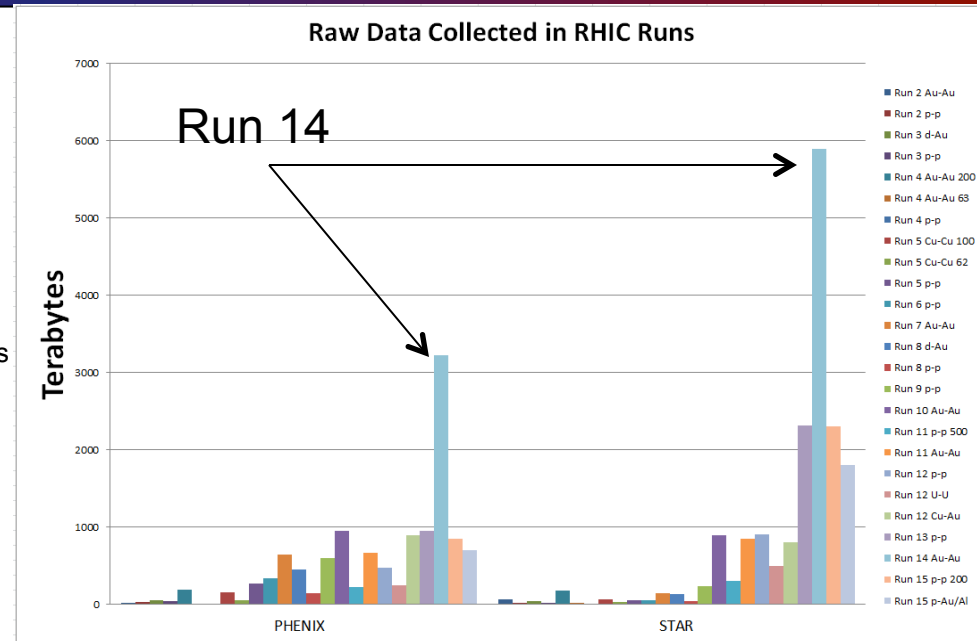
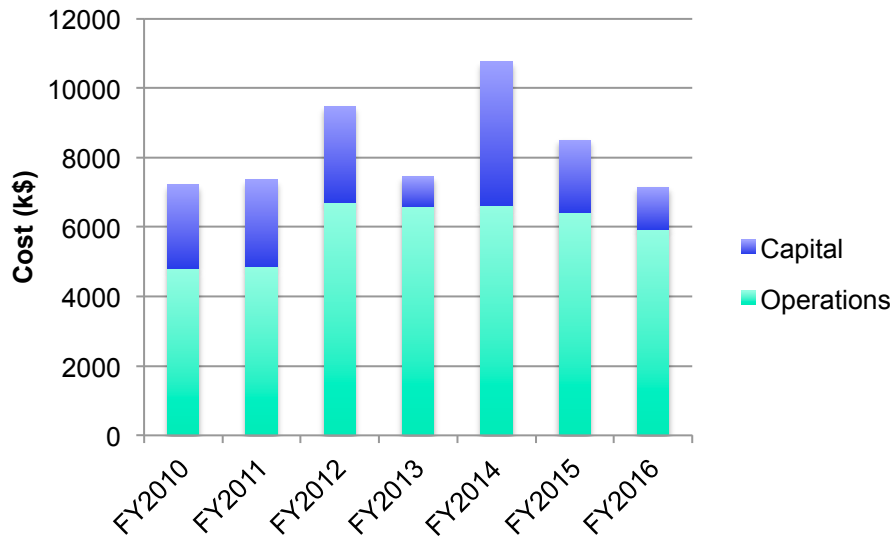
Near the end of a global assessment process

- Assessed in Physics Dept. future needs, productivity, and leadership
- Also in the process of assessing Physics/C-AD allocation
- In the context of shifting program
 - 1 running experiment, 1 experiment analyzing past data, 1 major upgrade

Will lead to loss of analysis productivity and a loss in flexibility

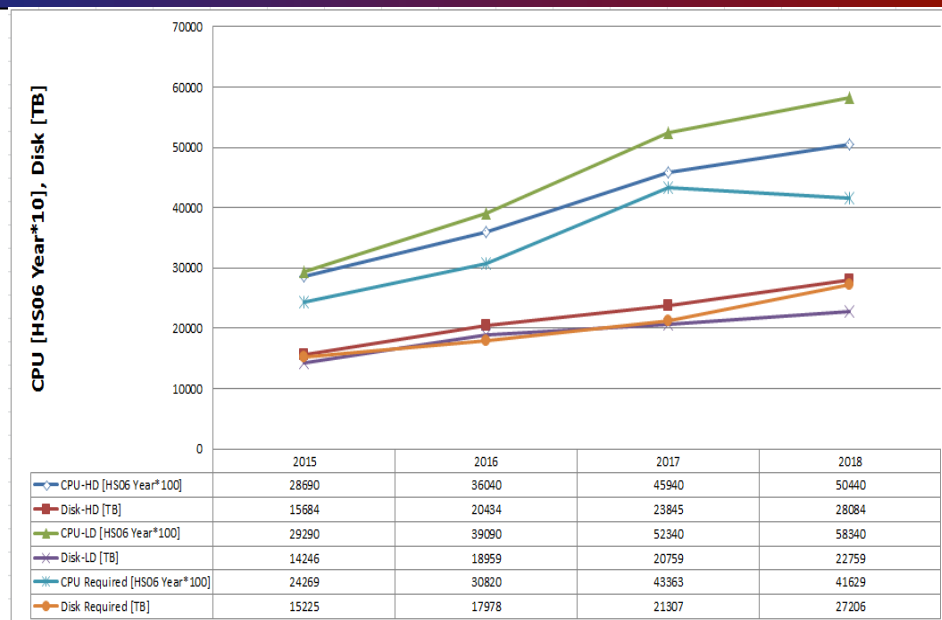
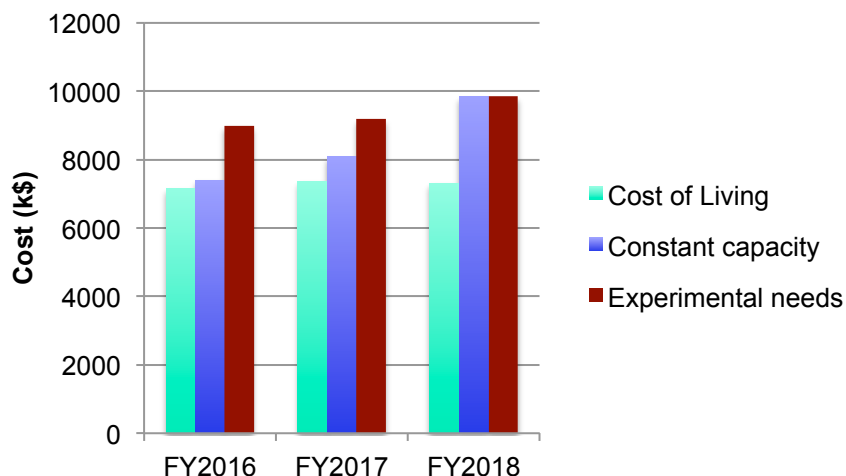
- Topics not squarely in the mainstream will be lost
- Limit to local participation in the completion of the PHENIX mission
- Some long-payoff and high-risk topics will not be pursued

RHIC Computing Facility History



- Attempts to match increased funding to increased need
 - FY10: DAQ upgrades in both PHENIX and STAR
 - FY12: maximizing output from longitudinal p+p 500 GeV campaigns and timely analysis of heavy ion campaigns
 - FY14: need for large minimum-bias datasets to reach physics goals with vertex detectors

RCF Computing Capacity Projections



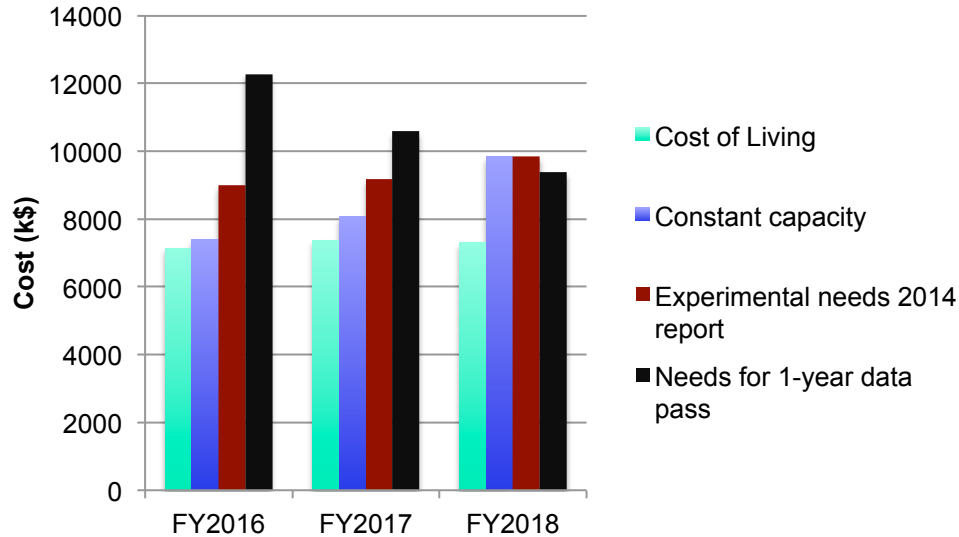
Item / Year	FY2014	FY2015	FY2016	FY2017	FY2018
Operating Cost [\$]	5,557,385	6,045,444	6,388,683	6,786,759	6,863,247
Comp/distr. Storage Cost [\$]	3,358,000	683,669	1,599,562	1,108,509	0
Large Equipment Cost [\$]	2,569,219	2,070,888	1,000,755	1,288,133	2,979,258
Required Funds [\$]	11,484,604	8,800,001	8,989,000	9,183,401	9,842,505

From response to 2014 S&T review

- Experiments desire increase of computing capacity by factor ~2 by 2018
 - Enable STAR: 2-year staggering of reconstruction (e.g. FY16 data by FY18)
- Planned funding will stretch analysis time of FY14-FY17 data beyond this

Computing Resource Needs Update

From F. Geurts for STAR to 2015 PAC



DATASET	Production STATUS
2014	70% by end of 2015
2014	100% by spring of 2016
2015	50% “preview” by end of 2016
2015	100% pass by 2018
2017	100% ~ 2020!

- Response to 2014 S&C review: 2-year analysis delay
 - Required a doubling of computing capacity by FY2018
 - Planned funding does not allow this, but would stretch further
- Since then: addition of p+p 500 GeV Run in FY2017
- New rough estimate for needs to analyze in 1-year timeframe
 - At the same time with a reassessment of timing of major HPSS upgrades

Computing: Path Forward

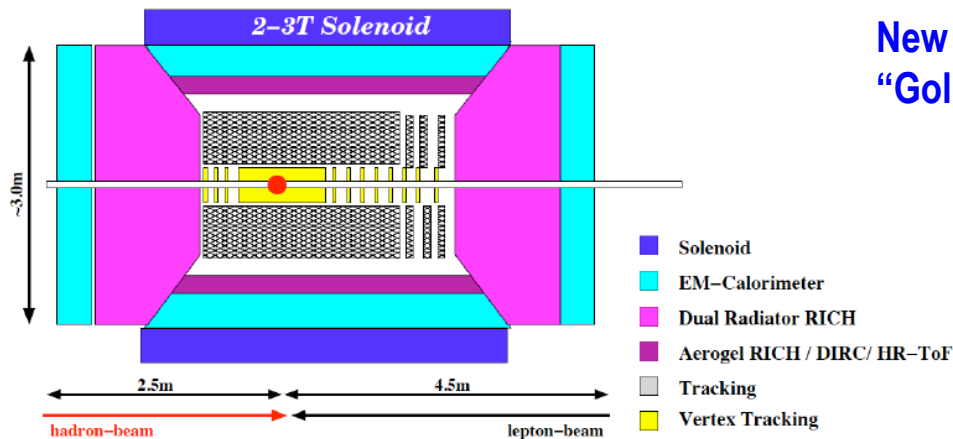
- Brookhaven PAC recommendation June 2015:
 - “The shortage of computer resources for STAR will be accompanied by an increased time between data-taking and availability of data for analysis, which presents a major risk to expeditious dissemination and publication of the important science anticipated from the program and may result in missed or delayed opportunities for scientific impact.”
 - “BNL Management must investigate the availability and use of additional computing resources within the laboratory and commercially outside the laboratory, or seek additional computing resources, to enable timely reconstruction of STAR data.”
- We are investigating alternate sources
 - Possibilities from the BNL Computing Initiative
 - Potential in using resources as they are building up for other needs
 - But: potential has not materialized to date
 - STAR is investigating resources from international partners
 - Successful model in KISTI, but that has lapsed
 - Potential in Russia, China, Germany; but still technical and political hurdles
 - STAR has shown Cloud capability; but costs need to be assessed

Electron Ion Collider Generic Detector R&D

Peer-Reviewed program established in 2011 to enable EIC experiments

Funded by DOE; managed by BNL: ~1M\$-1.5M\$/year

Current Plan is to continue this at the same level: \$1M for FY16 allocated

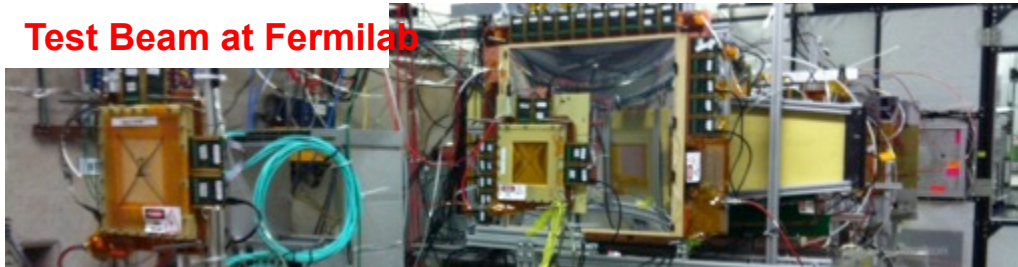


New and improved detector technology, focused on EIC
“Golden Measurements” in the collider environment.

Essential software development for EIC
physics simulation and experiment design.

Coordinated efforts among CEBAF, RHIC, and
HEP communities.

Test Beam at Fermilab



Initiating consortia of Universities
and National Labs as a first step
toward building scientific
collaborations to successfully mount
EIC experiments.

Standing Advisory Committee meets twice per year. Recent meeting: January, 2015

Committee members are:

M. Demarteau (ANL/Chair), C. Haber (LBNL), P. Krizan (Ljubljana), I. Shipsey (Purdue/Oxford),
R. Van Berg (U. Pennsylvania), J. Va'vra (SLAC), G. Young (JLab)

Challenging time

- Need to navigate transition of experiments

 - Support the one experiment at RHIC during Beam Energy Scan Phase 2

 - Support completion of the scientific mission of PHENIX
 - Support R&D towards “sPHENIX”

While we need to reduce staff to match budget authority

While we need to find ways to increase computing capacity to enable the science of the FY14-FY17 campaign

